

REVIEW COMMENT RECORD (RCR)				1. Date 04/06/05	2. Review No.
				3. Project No. 200-LW-1/LW-2	4. Page 1 of 1
5. Document Number(s)/Title(s) Validation Package for SDG W04366		6. Program/Project/Building Number Borehole Soil Sampling	7. Reviewer RL Weiss	8. Organization/Group ERC - S&DM	9. Location/Phone Sigma 1 372-9631
17. Comment Submittal Approval:  _____ Organization Manager (Optional)		10. Agreement with indicated comment disposition(s)  04/06/2005 _____ Date R. L. Weiss _____ Reviewer/Point of Contract R. L. Weiss _____ Author/Originator		11. Closed  4-15-05 _____ Date Richard L. Weiss _____ Reviewer/Point of Contact Richard L. Weiss _____ Author/Originator	
12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Reviewer Concurrence Required	15. Disposition (Provide justification if NOT accepted.)		16. Status
1	Radiochemistry, Pages 3 & 23; MDAs for Th-232, Ni-63, Tc-99, & Sr-90 all exceed CRDL. Documentation states only two exceeded.		Case 12		OK 4-15-05

RECEIVED  
 OCT 27 2005  
 EDMC

0067327



F03-00

Date: 24 March 2005  
To: Fluor Hanford Inc. (technical representative)  
From: TechLaw, Inc.  
Project: 200-LW-1/LW-2 Characterization - Soil  
Subject: Radiochemistry - Data Package No. W04366



## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. W04366 prepared by Severn Trent (STL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
B193K0	8/18/04	Soil	C	See note 1

1 - Gamma spectroscopy (radium-226 & radium-228), isotopic thorium-232, tritium, technetium-99, nickel-63, carbon-14, strontium-90.

Data validation was conducted in accordance with the FHI validation statement of work and the 200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan (DOE/RL-2001-66, Draft A, Redline, May 2002). Appendices 1 through 6 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation
- Appendix 6. Additional Documentation Requested by Client

## **DATA QUALITY OBJECTIVES**

- **Holding Times**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

All holding times were acceptable.

000001

- **Laboratory (Method) Blanks**

#### Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the required detection limit (RDL), the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the minimum detectable activity (MDA) are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All laboratory blank results were acceptable.

#### Field Blanks

No field blanks were submitted for analysis.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample (LCS) and matrix spike (MS) recovery range is 65-135% or 70-130%, depending on the analyte. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to the lack of an LCS analysis, all thorium-228(aspec) and thorium-232(aspec) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the contract required detection limit (CRDL) and the RPD is less than +/- 35 percent, the results are acceptable. If

000002

either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

#### Field Duplicate Samples

No field duplicates were submitted for analysis.

- **Detection Levels**

Reported analytical detection levels are compared against the required target quantitation limits (RTQLs) to ensure that laboratory detection levels meet the required criteria. Four analytes exceeded the RTQL. Under the FHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific RTQL.

- **Completeness**

Data package SDG No. W04366 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

#### **MAJOR DEFICIENCIES**

None found.

#### **MINOR DEFICIENCIES**

Due to the lack of an LCS analysis, all thorium-228(aspec) and thorium-232(aspec) results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the FHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

Four analytes exceeded the RTQL. Under the FHI statement of work, no qualification is required.

000003

## REFERENCES

FHI, Contract #20266, *Validation Statement of Work*, Fluor Hanford Incorporated, July 7, 2003.

DOE/RL-2001-66, Draft A, Redline, *200-LW-1/200-LW-2 Chemical Laboratory Waste Group OUs RI/FS Work Plan*, May 2002.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

**000005**

Qualifiers which may be applied by data validators in compliance with the FHI statement of work are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.



**Appendix 2**  
**Summary of Data Qualification**

**000007**

# RADIOCHEMISTRY DATA QUALIFICATION SUMMARY\*

SDG: W04366	REVIEWER: TLI	DATE: 3/24/05	PAGE_1_ OF 1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Thorium-228(aspec) Thorium-232(aspec)	J	All	No LCS analysis

\* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

000008

Project: FLUOR-HANFORD			
Laboratory: Severn Trent			
Case:	SDG: W04366		
Sample Number	B193K0		
Remarks			
Sample Date	8/18/04		
Radiochemistry	RTQL	Result	Q
Thorium-228		0.792	UJ
Thorium-230		1.65	U
Thorium-232	1	0.486	UJ
Carbon-14	50	0.295	U
Nickel-63	30	139	U
Technetium-99	15	3.97	U
Tritium	400	0.187	
Strontium-90	1	3820	U
Radium-226		0.505	U
Radium-228		0.82	U

000010

\* - TDL exceeded

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize potential miss-interpretation of results. All other qualifiers shown were applied during validation.

## FORM I

Date: 27-Oct-04

## SAMPLE RESULTS

Lab Name: STL Richland  
 Lot-Sample No.: J4H250123-1  
 Client Sample ID: B193K0

SDG: W04366  
 Report No.: 27009  
 COC No.:

Collection Date: 8/18/2004 11:25:00 AM  
 Received Date: 8/24/2004 2:50:00 PM  
 Matrix: SOIL

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error ( 2 s)	Total Uncert( 2 s)	MDC MDA, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 4257330	THISO_IE_PRECIP_AEA				Work Order: GNVH61AE		Report DB ID: 9GNVH610					
TH-226	7.92E-01	U I	2.87E+00	6.20E+00	7.74E+00	pCi/g	90%	0.1	10/10/04 08:00 a		0.01	ALP113
							2.53E+00	1.00E+00			G	
TH-230	1.65E+00	U	2.66E+00	1.17E+01	4.67E+00	pCi/g	90%	0.35	10/10/04 08:00 a		0.01	ALP113
							1.07E+00	1.00E+00			G	
TH-232	4.86E-01	U I	1.91E+00	3.87E+00	5.55E+00	pCi/g	90%	0.09	10/10/04 08:00 a		0.01	ALP113
							1.51E+00	1.00E+00			G	
Batch: 4257332	C14_LSC				Work Order: GNVH61AJ		Report DB ID: 9GNVH610					
C-14	2.95E-01	U	6.75E-01	8.24E-01	1.61E+00	pCi/g	100%	0.18	9/27/04 11:37 p		1.008	LSC3
							7.72E-01	5.00E+01			G	
Batch: 4257335	NI63LSC				Work Order: GNVH61AD		Report DB ID: 9GNVH610					
NI-63	1.39E+02	U	6.61E+01	6.06E+02	1.51E+02	pCi/g	86%	0.93	10/18/04 11:00 p		0.01	LSC4
							7.34E+01	3.00E+01			G	
Batch: 4257338	TC99_ETVDSK_LSC				Work Order: GNVH61AG		Report DB ID: 9GNVH610					
TC-99	3.97E+00	U	1.07E+01	1.55E+01	2.48E+01	pCi/g	100%	0.16	10/21/04 01:03 p		0.05	LSC4
							1.19E+01	1.50E+01			G	
Batch: 4257340	906.0_H3_LSC				Work Order: GNVH61AH		Report DB ID: 9GNVH610					
H-3	1.87E-01		4.02E-02	9.97E-02	7.42E-02	pCi/g	100%	(2.5)	9/24/04 10:46 p		40.0	LSC4
							3.44E-02	4.00E+02			G	
Batch: 4257343	SRTOT_SEP_PRECIP_GPC				Work Order: GNVH61AC		Report DB ID: 9GNVH610					

STL Richland MDC|MDA, Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.  
 rptSTLRchSample U Qual - Analyzed for, but the result is less than the Mdc/Mda|Total Uncert or gamma scan software did not identify the nuclide.  
 V4.9.4 A97

3/20/05

000011

# FORM I SAMPLE RESULTS

Date: 27-Oct-04

Lab Name: STL Richland  
Lot-Sample No.: J4H250123-1  
Client Sample ID: B193K0

SDG: W04366  
Report No.: 27009  
COC No.:

Collection Date: 8/18/2004 11:25:00 AM  
Received Date: 8/24/2004 2:50:00 PM  
Matrix: SOIL

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error ( 2 s)	Total Uncert( 2 s)	MDC MDA, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
STRONTIUM	3.82E+03	U	1.88E+02	2.65E+04	6.50E+01	pCi/g	83%	(58.7)	10/14/04 07:34 p		0.01	GPC28A
						3.01E+01		0.29			G	
Batch: 4257348	GAMMA_GS		Work Order: GNVH61AF		Report DB ID: 9GNVH610							
RA-226	5.05E-01	U	2.26E-01	2.26E-01	3.59E-01	pCi/g		(1.4)	10/12/04 11:46 a		51.5	GER1\$1
								(4.5)			g	
RA-226	2.15E-01	U	3.02E-01	3.02E-01	3.26E-01	pCi/g		(2.5)	10/12/04 11:46 a		51.5	GER1\$1
							2.00E-01	(5.4)			g	

No. of Results: 10      Comments:

*K*  
*3/20/05*

STL Richland      MDC|MDA,Lc - Detection, Decision Level based on Instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.  
rptSTLRchSample      U Qual - Analyzed for, but the result is less than the Mdc/Mda|Total Uncert or gamma scan software did not identify the nuclide.  
V4.9.4 A97

## **Appendix 4**

### **Laboratory Narrative and Chain-of-Custody Documentation**

---

**Liquid Scintillation Counting**  
Carbon-14 by method RICHRC5022  
Nickel-63 by method RICHRC5069  
Technecium-99 by method RICHRC5078  
Tritium by method RICHRC5037

#### **IV. Quality Control**

The analytical results for each analysis performed under SDG W04366 includes a minimum of one laboratory control sample (LCS), one method (reagent) blank, and one duplicate sample analysis. Any exceptions have been noted in the "Comments" section.

QC and sample results are reported in the same units.

#### **V. Comments**

##### **Alpha Spectroscopy**

###### **Thorium-232 by method RICHRC5084**

The MDA was not achieved for sample B193K0; the volume analyzed was reduced as determined by screening activities. The MDA was achieved on the blank and LCS and the data are accepted. Except as noted, the LCS, batch blank, sample results and Sample duplicate (B193K0) are within contractual requirements.

##### **Gamma Spectroscopy**

###### **Gamma (Ra-226, -228) by method RICHRC5017**

There was insufficient sample received to analyze a separate duplicate sample fraction, therefore the precision determination was performed by recounting the sample aliquot on a separate detector.

High activities of other nuclides above the energy of interest prohibits achieving the MDA for Ra-226 and Ra-228 due to Compton Scattering caused by matrix effect for sample B193K0 and its duplicate.

The blank Ra-226 result is greater than the CRDL: possibly indigenous to the matrix sand used for the blank.

The Ra-226 and Ra-228 (sample B193K0 and its duplicate) results reported may be possible false positive values. Although the key-line activity is greater than the achieved MDA, the identification of these radionuclides are rejected by abundance criteria.

Am-241, Co-60 and Cs-137 are detected in Samples B193K0 and its duplicate.

Except as noted, the LCS, batch blank, sample results and Sample duplicate (B193K0) are within contractual requirements.

---

**Gas Proportional Counting**

**Total Strontium by method RICHRC5006**

The MDA was not achieved for samples B194K0 and its duplicate however the sample results are greater than the CRDL and the data is accepted. Except as noted, the LCS, batch blank, sample results and Sample duplicate (B193K0) are within contractual requirements.

**Liquid Scintillation Counting**

**Carbon-14 by method RICHRC5022**

The LCS, batch blank and sample results are within contractual requirements.

**Nickel-63 by method RICHRC5069**

The MDA was not achieved for samples B193K0: the volume analyzed was reduced due to sample screening activity and the data are accepted. Except as noted, the LCS, batch blank, sample results and Sample duplicate (B193K0) are within contractual requirements.

**Technecium-99 by method RICHRC5078**

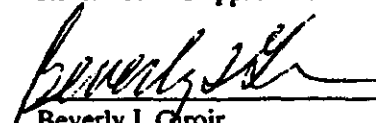
The MDA was not achieved for samples B193K0: the volume analyzed was reduced due to sample screening activity and the data are accepted. Except as noted, the LCS, batch blank, matrix spike (B19MK0), sample results and sample duplicate (B193K0) are within contractual requirements.

**Tritium by method RICHRC5037**

The LCS, batch blank, sample results and Sample duplicate (B193K0) are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager, or a designee as verified by the following signature.

Reviewed and approved:

  
Beverly I. Giroir  
Project Manager





**Appendix 5**

**Data Validation Supporting Documentation**

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-LW-1/LW-2			DATA PACKAGE: W04366		
VALIDATOR: TWP		LAB: ST		DATE: 7/20/05	
			SDG: W04366		
ANALYSES PERFORMED					
Gross Alpha/Beta	Strontium-90	Technetium-99	Alpha Spectroscopy	Gamma Spectroscopy	
Total Uranium	Radium-22	Tritium	NI-63	C-14	
SAMPLES/MATRIX					
B193FO					
Soil					

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Comments: \_\_\_\_\_

00b018

3. Continuing Calibration (Levels D, E)

☒ N/A

Calibration checked within required frequency? ..... Yes No N/A

Calibration check acceptable? ..... Yes No N/A

Calibration check standards traceable? ..... Yes No N/A

Calibration check standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Background Counts (Levels D, E) ..... ☒ N/A

Background Counts checked within required frequency? ..... Yes No N/A

Background Counts acceptable? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5. Blanks (Levels B, C, D, E) ..... ☐ N/A

Method blank analyzed within required frequency? ..... Yes ☒ No ☐ N/A ☐

Method blank results acceptable? ..... Yes ☒ No ☐ N/A ☐

Analytes detected in method blank? ..... Yes ☐ No ☒ N/A ☐

Field blank(s) analyzed? ..... Yes ☐ No ☒ N/A ☐

Field blank results acceptable? ..... Yes ☐ No ☒ N/A ☐

Analytes detected in field blank(s)? ..... Yes ☐ No ☒ N/A ☐

Transcription/Calculation Errors? (Levels D, E) ..... Yes ☐ No ☒ N/A ☐

Comments: NO FB

6. Laboratory Control Samples or Blank Spike Samples (Levels C, D, E) ..... ☐ N/A

LCS /BSS analyzed within required frequency? ..... Yes ☐ No ☒ N/A ☐

LCS/BSS recoveries acceptable? ..... Yes ☒ No ☐ N/A ☐

LCS/BSS traceable? (Levels D,E) ..... Yes ☐ No ☒ N/A ☐

LCS/BSS expired? (Levels D,E) ..... Yes ☐ No ☒ N/A ☐

LCS/BSS levels correct? (Levels D,E) ..... Yes ☐ No ☒ N/A ☐

Transcription/Calculation Errors? (Levels D, E) ..... Yes ☐ No ☒ N/A ☐

Comments: NO Th-228 or Th-232 Lcs - J all

7. Chemical Carrier Recovery (Levels C, D, E) ..... ☒ N/A

Chemical carrier added? ..... Yes ☐ No ☐ N/A ☒

Chemical recovery acceptable? ..... Yes ☐ No ☐ N/A ☒

Chemical carrier traceable? (Levels D, E ) ..... Yes ☐ No ☐ N/A ☒

000020

Chemical carrier expired? (Levels D, E) ..... Yes No N/A

Transcription/Calculation errors? (Levels D, E) ..... Yes No N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. Tracer Recovery (Levels C, D, E ) ..... ☐ N/A

Tracer added? ..... ☒ Yes No N/A

Tracer recovery acceptable? ..... ☒ Yes No N/A

Tracer traceable? (Levels D, E ) ..... Yes No ☒ N/A

Tracer expired? (Levels D, E) ..... Yes No ☒ N/A

Transcription/Calculation errors? (Levels D, E) ..... Yes No ☒ N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9. Matrix Spikes (Levels C, D, E) ..... ☐ N/A

Matrix spike analyzed? ..... ☒ Yes No N/A

Spike recoveries acceptable? ..... ☒ Yes No N/A

Spike source traceable? (Levels D, E) ..... Yes No ☒ N/A

Spike source expired? Levels D, E) ..... Yes No ☒ N/A

Transcription/Calculation Errors? (Levels D, E) ..... Yes No ☒ N/A

Comments: all but TC-99 - use yield - per FH1

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

10. Duplicates (Levels C, D, E) ..... ☐ N/A

Duplicates Analyzed at required frequency? ..... ☒ Yes ☐ No ☐ N/A

RPD Values Acceptable? ..... ☒ Yes ☐ No ☐ N/A

Transcription/Calculation Errors? (Levels D, E) ..... ☐ Yes ☐ No ☒ N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11. Field QC Samples (Levels C, D E) ..... ☐ N/A

Field duplicate sample(s) analyzed? ..... ☐ Yes ☒ No ☐ N/A

Field duplicate RPD values acceptable? ..... ☐ Yes ☐ No ☒ N/A

Field split sample(s) analyzed? ..... ☐ Yes ☐ No ☒ N/A

Field split RPD values acceptable? ..... ☐ Yes ☐ No ☒ N/A

Performance audit sample(s) analyzed? ..... ☐ Yes ☐ No ☒ N/A

Performance audit sample results acceptable? ..... ☐ Yes ☐ No ☒ N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12. Holding Times (All levels)

Are sample holding times acceptable? ..... ☒ Yes ☐ No ☐ N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

13. Results and Detection Limits (All Levels )..... ☐ N/A

Results reported for all required sample analyses?..... ☒ Yes No ☐ N/A

Results supported in raw data?(Levels D, E)..... Yes No ☒ N/A

Results Acceptable? (Levels D, E) ..... Yes No ☒ N/A

Transcription/Calculation errors? (Levels D, E)..... Yes No ☒ N/A

MDA's meet required detection limits? ..... Yes ☒ No ☐ N/A

Transcription/calculation errors? (Levels D, E)..... Yes No ☒ N/A

Comments: TC-99 over

SR-90 over

ph232 over

Ni-63 over



## **Appendix 6**

### **Additional Documentation Requested by Client**

## FORM II

Date: 27-Oct-04

## DUPLICATE RESULTS

Lab Name: STL Richland

SDG: W04366

Collection Date: 8/18/2004 11:25:00 AM

Lot-Sample No.: J4H250123-1

Report No.: 27009

Received Date: 8/24/2004 2:50:00 PM

Client Sample ID: B193K0

COC No.:

Matrix: SOIL

Parameter	Result, Orig Rat	Qual	Count Error (2 s)	Total Uncert( 2 s)	MDC MDA, Action Lev	Rpt Unit, CRDL	Yield	Rat/MDC, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
Batch: 4257330	THISO_IE_PRECIP_AEA				Work Order: GNVH61AK	Report DB ID: GNVH61KR			Orig Sa DB ID: 9GNVH610			
TH-228	2.23E+00	U	3.31E+00	1.58E+01	6.09E+00	pCi/g	88%	0.37	10/10/04 08:00 a		0.01	ALP114
	7.92E-01	U	RPD 95.3			1.00E+00		0.28			G	
TH-230	1.79E+00	U	2.53E+00	1.26E+01	2.42E+00	pCi/g	88%	0.74	10/10/04 08:00 a		0.01	ALP114
	1.65E+00	U	RPD 8.2			1.00E+00		0.28			G	
TH-232	0.00E+00	U	0.00E+00	2.19E+00	2.42E+00	pCi/g	88%	0.	10/10/04 08:00 a		0.01	ALP114
	4.86E-01	U	RPD 200.0			1.00E+00		0.			G	
Alpha Spec Result Sum = 4.0E+00												
Batch: 4257332	C14_LSC				Work Order: GNVH61AL	Report DB ID: GNVH61LR			Orig Sa DB ID: 9GNVH610			
C-14	-2.00E-01	U	6.59E-01	8.06E-01	1.62E+00	pCi/g	100%	-0.12	9/28/04 12:19 a		1.004	LSC3
	2.95E-01	U	RPD 1042.8			5.00E+01		-0.5			G	
Alpha Spec Result Sum = 4.0E+00												
Batch: 4257335	NI63LSC				Work Order: GNVH61AM	Report DB ID: GNVH61MR			Orig Sa DB ID: 9GNVH610			
NI-63	1.08E+02	U	5.60E+01	5.16E+02	1.28E+02	pCi/g	85%	0.84	10/19/04 12:42 a		0.01	LSC4
	1.39E+02	U	RPD 25.8			3.00E+01		0.42			G	
Alpha Spec Result Sum = 4.0E+00												
Batch: 4257338	TC99_ETVDSK_LSC				Work Order: GNVH61AP	Report DB ID: GNVH61PR			Orig Sa DB ID: 9GNVH610			
TC-99	1.89E+00	U	1.06E+01	1.53E+01	2.47E+01	pCi/g	100%	0.07	10/21/04 03:08 p		0.05	LSC4
	3.97E+00	U	RPD 80.6			1.50E+01		0.22			G	
Alpha Spec Result Sum = 4.0E+00												
Batch: 4257340	906.0_H3_LSC				Work Order: GNVH61AQ	Report DB ID: GNVH61QR			Orig Sa DB ID: 9GNVH610			

STL Richland

RPD - Relative Percent Difference.

rptSTLRchDupV4.9  
.4 A97

MDC|MDA, Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

U Qual - Analyzed for, but the result is less than the Mdc/Mda/Total Uncert or gamma scan software did not identify the nuclide.

0000025

## FORM II

Date: 27-Oct-04

## DUPLICATE RESULTS

Lab Name: STL Richland

SDG: W04366

Collection Date: 8/18/2004 11:25:00 AM

Lot-Sample No.: J4H250123-1

Report No.: 27009

Received Date: 8/24/2004 2:50:00 PM

Client Sample ID: B193K0

COC No.:

Matrix: SOIL

Parameter	Result, Orig Rat	Qual	Count Error (2 s)	Total Uncert( 2 s)	MDC MDA, Action Lev	Rpt Unit, CRDL	Yield	Rat/MDC, Rat/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
H-3	1.82E-01		3.88E-02	9.67E-02	7.13E-02	pCi/g	100%	(2.6)	9/24/04 11:28 p		40.0	LSC4
	1.87E-01		RPD 2.5			4.00E+02		(3.8)			G	

Batch: 4257343	SRTOT_SEP_PRECIP_GPC			Work Order: GNVH61AR	Report DB ID: GNVH61RR	Orig Sa DB ID: 9GNVH610						
STRONTIUM	3.77E+03	U	1.84E+02	2.62E+04	6.23E+01	pCi/g	83%	(80.6)	10/14/04 07:34 p		0.01	GPC28B
	3.82E+03	U	RPD 1.2					0.29			G	

Batch: 4257346	GAMMA_GS			Work Order: GNVH61AT	Report DB ID: GNVH61TR	Orig Sa DB ID: 9GNVH610						
RA-226	4.62E-01	U	2.98E-01	2.96E-01	3.28E-01	pCi/g		(1.5)	10/12/04 11:46 a		47.1	GER4\$1
	5.05E-01	U	RPD 4.6					(3.3)			G	
RA-228	6.16E-01	U	2.81E-01	2.81E-01	3.22E-01	pCi/g		(1.9)	10/12/04 11:46 a		47.1	GER4\$1
	8.15E-01	U	RPD 27.7			2.00E-01		(4.4)			G	

No. of Results: 10    Comments:

STL Richland    RPD - Relative Percent Difference.

rptSTLRchDupV4.9    MDC|MDA,Le - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

A A97    U Qual - Analyzed for, but the result is less than the Mdc/Mda/Total Uncert or gamma scan software did not identify the nuclide.

# FORM II BLANK RESULTS

Date: 27-Oct-04

Lab Name: STL Richland

SDG: W04366

Matrix: SOIL

Report No.: 27009

Parameter	Result	Qual	Count Error (2 s)	Total Uncert( 2 s)	MDC/MDA	Rpt Unit, CRDL	Yield	Rst/MDC, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
Batch: 4257332	C14_LSC				Work Order: GP4C41AA	Report DB ID: GP4C41AB						
C-14	-5.04E-02	U	1.32E-01	1.61E-01	3.25E-01	pCi/g	100%	-0.16	9/27/04 10:12 p		5.0	LSC3
					1.56E-01	5.00E+01		-0.62			G	
Batch: 4257330	THISO_IE_PRECIP_AEA				Work Order: GP4CX1AA	Report DB ID: GP4CX1AB						
TH-228	-2.63E-03	U	3.03E-03	3.06E-03	5.46E-02	pCi/g	52%	-0.05	10/10/04 08:00 a		2.0	ALP116
					1.25E-02	1.00E+00		-(1.7)			G	
TH-230	-8.26E-04	U	1.65E-03	1.66E-03	4.16E-02	pCi/g	52%	-0.02	10/10/04 08:00 a		2.0	ALP116
					6.79E-03	1.00E+00		-1.			G	
TH-232	1.03E-02	U	2.07E-02	2.07E-02	2.80E-02	pCi/g	52%	0.37	10/10/04 08:00 a		2.0	ALP116
					1.00E+00			1.			G	
Batch: 4257335	NI63LSC				Work Order: GP4DE1AA	Report DB ID: GP4DE1AB						
NI-63	3.77E+00	U	2.85E+00	5.56E+00	6.61E+00	pCi/g	78%	0.57	10/19/04 02:24 a		0.25	LSC4
					3.22E+00	3.00E+01		(1.4)			G	
Batch: 4257338	TC99_ETVDSK_LSC				Work Order: GP4DX1AA	Report DB ID: GP4DX1AB						
TC-99	4.18E-02	U	1.08E-01	1.55E-01	2.49E-01	pCi/g	100%	0.17	10/21/04 04:10 p		5.0	LSC4
					1.19E-01	2.00E+01		0.54			G	
Batch: 4257340	908.0_H3_LSC				Work Order: GP4D81AA	Report DB ID: GP4D81AB						
H-3	9.08E-02	U	1.17E-01	2.50E-01	2.76E-01	pCi/g	100%	0.33	9/24/04 09:21 p		10.0	LSC4
					1.28E-01	4.00E+02		0.73			G	
Batch: 4257346	GAMMA_GS				Work Order: GP4E91AA	Report DB ID: GP4E91AB						
RA-226	1.13E-01	U	1.18E-01	1.18E-01	6.32E-02	pCi/g		(1.8)	10/12/04 11:45 a		52.0	GER5\$1
								(1.9)			g	

STL Richland MDC/MDA, Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.  
 rptSTLRchBlank U Qual - Analyzed for, but the result is less than the Mdc/Mda/Total Uncert or gamma scan software did not identify the nuclide.  
 V4.9.4 A97

000027

FORM II  
BLANK RESULTS

Date: 27-Oct-04

Lab Name: STL Richland  
Matrix: SOILSDG: W04366  
Report No.: 27009

Parameter	Result	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA	Rpt Unit, CRDL	Yield	Rst/MDC, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
RA-228	-1.29E-01	U	1.46E-01	1.46E-01	1.72E-01	pCi/g		-0.75	10/12/04 11:45 a		52.0	GER5\$1
						2.00E-01		-(1.8)			g	
Batch: 4257343	SRTOT_SEP_PRECIP_GPC				Work Order: GP4E51AA				Report DB ID: GP4E51AB			
STRONTIUM	-1.27E-02	U	4.60E-02	4.61E-02	1.14E-01	pCi/g	80%	-0.11	10/14/04 07:34 p		6.0	GPC28C
					5.29E-02			-0.55			G	

No. of Results: 10      Comments:

FORM II  
LCS RESULTS

Date: 27-Oct-04

Lab Name: STL Richland

SDG: W04366

Matrix: SOIL

Report No. : 27009

Parameter	Result	Count Qual Error (2 s)	Total Uncert(2 s)	MDC MDA	Report Unit	Yield	Expected	Expected Uncert	Recovery, Bias	Analysis, Prep Date	Allquot Size	Primary Detector
Batch: 4257332	C14_LSC				Work Order: GP4C41AC		Report DB ID: GP4C41CS					
C-14	7.28E+00	3.00E-01	4.58E-01	3.25E-01	pCi/g	100%	7.25E+00	2.34E-01	100%	9/27/04 10:55 p	5.0	LSC3
						Rec Limits:	70	130	0.0		G	
Batch: 4257330	THISO_IE_PRECIP_AEA				Work Order: GP4CX1AC		Report DB ID: GP4CX1CS					
TH-230	9.91E-01	1.69E-01	2.28E-01	3.29E-02	pCi/g	47%	1.14E+00	3.41E-02	87%	10/10/04 08:00 a	2.0	ALP118
						Rec Limits:	70	130	-0.1		G	
Batch: 4257335	NI63LSC				Work Order: GP4DE1AC		Report DB ID: GP4DE1CS					
NI-63	5.04E+02	8.55E+00	9.09E+01	6.07E+00	pCi/g	86%	5.07E+02	1.70E+01	99%	10/19/04 04:05 a	0.25	LSC4
						Rec Limits:	70	130	0.0		G	
Batch: 4257338	TC99_ETVDSK_LSC				Work Order: GP4DX1AD		Report DB ID: GP4DX1DS					
TC-99	8.17E+01	7.87E-01	5.03E+00	2.51E-01	pCi/g	100%	9.08E+01	1.15E+00	90%	10/21/04 05:12 p	5.0	LSC4
						Rec Limits:	70	130	-0.1		G	
Batch: 4257340	906.0_H3_LSC				Work Order: GP4D81AC		Report DB ID: GP4D81CS					
H-3	1.43E+00	1.83E-01	5.17E-01	2.81E-01	pCi/g	100%	1.38E+00	4.70E-02	105%	9/24/04 10:04 p	10.0	LSC4
						Rec Limits:	70	130	0.0		G	
Batch: 4257346	GAMMA_GS				Work Order: GP4E91AC		Report DB ID: GP4E91CS					
CS-137	8.98E-01	1.43E-01	1.43E-01	7.11E-02	pCi/g		8.81E-01	6.98E-02	102%	10/12/04 11:47 a	26.61	GER7\$1
						Rec Limits:	70	130	0.0		g	
RA-226	1.56E+00	2.78E-01	2.78E-01	1.15E-01	pCi/g		2.14E+00	3.61E-01	73%	10/12/04 11:47 a	26.61	GER7\$1
						Rec Limits:			-0.3		g	
Batch: 4257343	SRTOT_SEP_PRECIP_GPC				Work Order: GP4E51AC		Report DB ID: GP4E51CS					
STRONTIUM	1.18E+00	1.27E-01	3.33E-01	1.05E-01	pCi/g	83%	1.12E+00	1.36E-02	105%	10/14/04 07:34 p	6.0	GPC28D
						Rec Limits:	20	105	0.0		G	

STL Richland Bias - (Result/Expected)-1 as defined by ANSI N13.36.

rptSTLRchLcs  
V4.9.4 A97

## FORM II

Date: 27-Oct-04

## MATRIX SPIKE RESULTS

Lab Name: STL Richland

SDG: W04366

Lot-Sample No.: J4H250123-1

Report No.: 27009

Matrix: SOIL

Parameter	SpikeResult, Orig Rat	Qual	Count Error (2 s)	Total Uncert( 2 s)	MDC MDA	Rpt Unit, CRDL	Yield	Rec- overy	Exp- ected	Exp Uncert	Analysis, Prep Date	Aliquot Size	Primary Detector
Batch: 4257338	TC99_ETVDSK_LSC			Work Order: GNVH81AN		Report DB ID: GNVH81NW		Orig Sa DB ID: 9GNVH810					
TC-99	8.08E+03		7.77E+01	4.98E+02	2.47E+01	pCi/g	100%	89.01%	9.05E+03	.15E+0:	10/21/04 02:05 p	0.05	LSC4
	3.97E+00	RPD										G	

No. of Results: 1

Comments: